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March 27, 2013

Burt T. Osborne  
Assistant City Attorney  
Office of the City Attorney  
350 South 5<sup>th</sup> Street, room 210  
Minneapolis, MN 55415

RE: Supplemental Report  
Smith vs. City of Minneapolis, No. 11-CV-03071

Dear Mr. Osborne:

Below is a supplement to my initial report dated December 13, 2012 regarding the above named case. Since that initial report, I have had the opportunity to review the additional case materials you forwarded to me including the deposition transcripts of Officer Callahan, Officer Gorman, Dr. Baker, and myself; the affidavits of Callahan and Gorman for defendant's motion for summary judgment; the CD of the taser camera video; and four CDs of the YMCA videos. Except as noted, my opinions and testimony will be to a reasonable degree of medical certainty. If additional pertinent information is revealed and provided to me subsequent to this supplemental letter, my opinions may change.

The additional case materials do not change my stated opinion on this case that mechanical, restraint or positional asphyxia from prone restraint or compression did not cause respiratory compromise or asphyxiation that would have led to Mr. Smith's death. In formulating my opinion, I have relied upon an analysis of the facts of this case, as well as a review of the scientific and clinical research on restraint physiology in the medical literature.

In this case, Dr. Baker, the Hennepin County Medical Examiner, made a determination that the immediate cause of death of Mr. Smith was anoxic encephalopathy due to cardiopulmonary arrest due to mechanical asphyxia with prone restraint position as a significant condition. Plaintiff's experts believe that Mr. Smith was unable to breathe, or ventilate his lungs as a result of mechanical compression while being restrained in the prone position, such that he was unable to oxygenate his blood and tissues, leading to asphyxiation and cardiopulmonary arrest.

Dr. Baker notes in his deposition that there were no confirmatory autopsy findings for asphyxiation and that the determination of mechanical asphyxia was primarily based on a review of the events relating to Mr. Smith's altercation and restraint with officers,

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particularly the video evidence. However, the video evidence, as well as the testimony of Officers Gorman and Callahan indicate that Mr. Smith was vocalizing and in fact yelling at one point while being restrained. His ability to do so demonstrates that he was able to inspire and expire air, as well as ventilate his lungs. If Mr. Smith suffered asphyxiation as a result of being unable to breathe or ventilate from mechanical compression, he would not have been able to vocalize nor likely have any loud audible respirations, including agonal respirations.

In addition, there is clinical evidence that Mr. Smith did not suffer asphyxiation as a result of mechanical compression. As discussed at my deposition, both paramedics as well as Emergency Department medical personnel measured end-tidal carbon dioxide levels (etCO<sub>2</sub>) when caring for Mr. Smith. Carbon dioxide levels are an important measure of ventilatory status and, in fact, will change more quickly than oxygen levels with changes in breathing. That is, these levels rise rapidly when an individual is hypoventilatory or not breathing adequately. The etCO<sub>2</sub> levels in Mr. Smith measured by the paramedics and in the Emergency Department were not elevated to a degree to indicate that he had suffered asphyxiation from hypoventilation as a result of mechanical compression.

In my prior letter, I reviewed the scientific and clinical research on restraint physiology in the medical literature and how this information supported my opinion in this case. The theory of positional or restraint asphyxia as applied to prone restraint was largely based on a laboratory physiology study in human volunteers by Reay et al.<sup>1</sup> As noted in my initial letter, more recent studies by US and international investigators, not just myself, have refuted these findings.<sup>2,3,4,5,6,7,8</sup> In fact, no study, including the original Reay study has shown that prone restraint cause hypoxia or a decrease in blood oxygen levels that would lead to asphyxiation.

There are case series in the forensic pathology literature regarding sudden deaths during restraint. These cases highlight the fact that there are often no definitive autopsy findings for positional or restraint asphyxia and that investigation relies on "historical information and the mechanics of events".<sup>9,10</sup> This appears to be the case as well for Mr. Smith, and as noted above I believe the evidence does not support the notion that he suffered positional or restraint asphyxiation from mechanical compression. Importantly, there are also sudden deaths during restraint in individuals in other positions other than the prone position including supine, side and sitting positions.<sup>11,12</sup> Moreover, a recent, large epidemiologic study of over 1000 police restraint cases in the US and Canada found no association between prone positioning and death or asphyxiation. One restraint sudden death did occur in this study, but in an individual restrained in a non-prone position. No deaths occurred in individuals who were placed in the prone restraint position.<sup>13</sup> This epidemiologic data indicates that asphyxiation or respiratory compromise from prone restraint is not the underlying cause of these types of deaths.

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In conclusion, as stated in my previous letter, it is my opinion that mechanical asphyxia from prone restraint or compression did not cause respiratory compromise or asphyxiation that would have led to Mr. Smith's death.

In accordance with the Rules of Civil Procedure, my compensation for services rendered in association with this case are \$450/hour, including travel time and expenses. Other cases in which I have provided testimony over the past four years are: Chavez v. City of Los Angeles, 2008; Medina v. City of Los Angeles, 2008; McCullaugh v. Summit County, et al., Ohio, 2009; Marquez v. City of Phoenix, Arizona, 2009; La Blanc v. City of Los Angeles, et al., 2010; Martin v. Broadview Heights, Ohio, 2010; Petrisor v. City of Bellevue, Washington, 2011; Gabales v. County of San Joaquin, 2011; Burdine v Kaiser, Ohio, 2011.

Should you have any further questions, please do not hesitate to contact me at any time.

Sincerely,



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## References

- <sup>1</sup> Reay DT, Howard JD, Fligner CL, Ward RJ: Effects of positional restraint on oxygen saturation and heart rate following exercise. *American Journal of Forensic Medicine and Pathology* 1989; 9: 16.
- <sup>2</sup> Chan TC, Vilke GM, Neuman T, Clausen JL: Restraint position and positional asphyxia. *Annals of Emergency Medicine* 1997; 30: 578.
- <sup>3</sup> Chan TC, Vilke GM, Neuman T: Reexamination of custody restraint position and positional asphyxia. *American Journal of Forensic Medicine and Pathology* 1998; 19(3): 201.
- <sup>4</sup> Schmidt P, Snowden T: The effects of positional restraint on heart rate and oxygen saturation. *Journal of Emergency Medicine* 1999; 17(5): 777.
- <sup>5</sup> Parkes J: Sudden death during restraint: a study to measure the effect of restraint positions on the rate of recovery from exercise. *Med. Sci. Law* 2000; 40(1): 39.
- <sup>6</sup> Chan TC, Neuman T, Clausen J, Eisele J, Vilke GM: Weight force during prone restraint and respiratory function. *Am J Forensic Med Pathol* 2004; 25(3):185-189.
- <sup>7</sup> Michalewicz BA, Chan TC, Vilke GM, Levy SS, Neuman TS, Kolkhorst FW: Ventilatory and metabolic demands during aggressive physical restraint in healthy adults. *J Forensic Sci* 2007;52(1):171-175.
- <sup>8</sup> Cary NRB, et al: The effect of simulated restraint in the prone position on cardiorespiratory function following exercise in humans. *J Physiol* 1998;525:30p.
- <sup>9</sup> O'Halloran RL, Frank JG: Asphyxial death during prone restraint revisited. *Amer J Forensic Med Pathol* 2000;21:39-52.
- <sup>10</sup> Reay DT, Fligner CL, Stillwell AD, Arnold J: Positional asphyxia during law enforcement transport. *Amer J Forensic Med Pathol* 1992;13:90-7.
- <sup>11</sup> Park KS, Korn CS, Henderson SO: Agitated delirium and sudden death: two case reports. *Prehosp Emerg Care* 2001;5:214-6.
- <sup>12</sup> Hick JL, Smith SW, Lynch MT: Metabolic acidosis in restraint-associated cardiac arrest: a case series. *Acad Emerg Med* 1999;6:239-43.
- <sup>13</sup> Hall CA, McHale AMD, Kader AS, et al: Incidence and outcome of prone positioning following police use of force in a prospective, consecutive cohort of subjects. *J Forensic Leg Med* 2012;19:83-9.